

C L A I M S

1. A method of molding and curing a tyre for vehicle wheels comprising the steps of: building a green tyre (50) on a toroidal support (10) having an outer surface the shape of which substantially matches that of an inner surface of said green tyre (50); heating said toroidal support (10) to transmit heat to the inner surface of the tyre in contact with said toroidal support (10); pressing 10 said inner surface of said green tyre (50) against said outer surface of said toroidal support (10) through at least one secondary working fluid under pressure; pressing an outer surface of said green tyre (50) against the walls of a molding cavity (104) defined in a 15 vulcanisation mold (102), through a primary working fluid under pressure passing in at least one diffusion gap between said outer surface of said toroidal support (10) and said inner surface of said green tyre (50); said primary working fluid under pressure being heated so as 20 to supply heat to said green tyre (50) to cause vulcanisation of same.
2. A method as claimed in claim 1, wherein heating of said toroidal support (10) is carried out by means of 25 electric resistors.
3. A method as claimed in claim 1, wherein heating of said toroidal support (10) is carried out through said primary working fluid conveyed into said toroidal support 30 (10).
4. A method as claimed in claim 1, wherein during the step of pressing said inner surface of said green tyre (50) against said outer surface of said toroidal support 35 (10) by said secondary working fluid under pressure, the pressure of said secondary working fluid is greater than the pressure of said primary working fluid.

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5. A method as claimed in claim 4, wherein the pressure of said primary working fluid is less than 16 bars.
- 5 6. A method as claimed in claim 4 wherein the pressure of said secondary working fluid is included between 8 and 18 bars.
- 10 7. A method as claimed in claim 1, wherein during the step of pressing an outer surface of said green tyre (50) against the walls of said molding cavity (104) by means of said primary working fluid, the pressure of said primary working fluid is included between 18 and 35 bars.
- 15 8. A method as claimed in claim 1, wherein the temperature of said primary working fluid is included between 170°C and 210°C.
- 20 9. A method as claimed in claim 1, wherein said primary working fluid comprises steam and nitrogen.
10. A method as claimed in claim 1, wherein said step of pressing said inner surface of said green tyre (50) against said outer surface of said toroidal support (10) comes before said step of heating said toroidal support (10) in order to transmit heat to the inner surface of said tyre in contact with said toroidal support (10).
- 30 11. A method as claimed in claim 1, wherein said step of pressing said inner surface of said green tyre (50) against said outer surface of said toroidal support (10) comes after said step of heating said toroidal support (10) in order to transmit heat to the inner surface of said tyre in contact with said toroidal support (10).
- 35 12. A method as claimed in claim 1, wherein said step of pressing said inner surface of said green tyre (50)

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against said outer surface of said toroidal support (10) takes place substantially simultaneously with said step of heating said toroidal support (10) in order to transmit heat to the inner surface of said tyre in 5 contact with said toroidal support (10).

13. A method as claimed in claim 1, further comprising the step of transmitting heat to the external surface of the bead region of said green tyre (50).

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14. An apparatus for molding and curing a tyre for vehicle wheels, said apparatus (101) comprising: an airtight vulcanisation mold (102) arranged to receive a toroidal support (10) adapted to support a green tyre 15 (50) within a molding cavity (104); at least one passage device adapted to feed at least one primary working fluid under pressure, which is formed through said toroidal support (10) and opens onto the outer surface of same, so as to enable passage of said primary working fluid under 20 pressure towards the inner surface of said green tyre (50); a feeding device to supply a secondary working fluid under pressure, which is operatively associated with said vulcanisation mold (102) to press said green tyre (50) from the outside to the inside onto said outer 25 surface of said toroidal support (10); heating devices to heat said toroidal support (10); heating devices to heat said primary working fluid to transmit heat to said green tyre (50) and cause vulcanisation of same.

30 15. An apparatus as claimed in claim 14, wherein said feeding device of a secondary working fluid under pressure comprises at least one delivery duct (108) and one discharge duct (109).

35 16. An apparatus as claimed in claim 14, wherein said primary working fluid is designed to heat said toroidal support (10).

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17. An apparatus as claimed in claim 14, wherein said heating devices of said toroidal support (10) comprise electric resistors.

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18. An apparatus as claimed in claim 14, wherein said airtight mold (102) comprises a lower half (102A) and an upper half (102B) in engagement with a base (103A) and a closing portion (103B) respectively, at least one 10 circumferential seal (107) placed on the opposite surfaces of the two halves (102A, 102B) and a plurality of seals (106) placed close to vents intended for release of said primary working fluid.

15 19. An apparatus for molding and curing a tyre for vehicle wheels, said apparatus (101) comprising: a vulcanisation mold arranged to receive a toroidal support (10) adapted to support a green tyre (50) within a molding cavity; at least one passage device, adapted to 20 feed at least one primary working fluid under pressure, which is formed through said toroidal support (10) and opens onto the outer surface of same, so as to enable passage of said primary working fluid under pressure to the inner surface of said green tyre (50); heating 25 devices to heat said primary working fluid to transmit heat to said green tyre (50) and cause vulcanisation of same; an airtight device (200) arranged to receive said toroidal support (10); a feeding device to supply a secondary working fluid under pressure which is 30 operatively associated with said airtight device (200) for pressing said green tyre (50) from the outside to the inside onto said outer surface of said toroidal support (10); heating devices to heat said toroidal support (10).

35 20. An apparatus as claimed in claim 19, wherein said airtight device (200) comprises a lower half (202A) and an upper half (202B) in engagement with a base (203A) and

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a closing portion (203B) respectively, and at least one circumferential seal (207) placed on the opposite surfaces of the two halves (202A, 202B).

5 21. An apparatus as claimed in claim 19, wherein said feeding device of said secondary working fluid under pressure comprises at least one delivery duct (208) and one discharge duct (209) to respectively feed and evacuate said secondary working fluid within said device
10 (200).

22. An apparatus as claimed in claim 19, wherein said airtight device (200) comprises at least one duct (210) for feeding said primary working fluid.

15 23. An apparatus as claimed in claim 19, wherein said heating devices of said toroidal support (10) comprise electric resistors.

20 24. An apparatus as claimed in claim 19, wherein said airtight device (200) comprises at least a heating device (250) for transmitting heat to the external surface of said green tyre (50).

25 25. An apparatus as claimed in claim 24, wherein said heating device (250) is powered by electric resistors.

26. An apparatus as claimed in claims 22 and 24, wherein
30 said heating device (250) is powered by said primary working fluid.